CASE REPORT

An Innovative Way to Retract Anteriors in Noncompliant Patient: A Case Report

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Abstract

Aim: To design and fabricate an innovative appliance for the purpose of diminishing treatment duration and enhancing patient compliance in non-complaint patients.

Background: A patient reported to the orthodontic department for conventional orthodontic treatment but as the treatment progressed, he started loosing motivation which was followed by the deficiency in adherence to the treatment protocol and became less concerned. In few months, he stopped following proper instructions on taking care of the appliances leading to increase in the chances of frequent appliance breakage at every appointment.

Case description: A patient reported with Class I molar and end-on canine relationship on both sides, retained deciduous second molar in upper and lower arches, increased overjet, mild generalized spacing in upper anteriors with severe crowding in lower arch anterior region and incompetent lips. On Cephalometric analysis, it showed Class I skeletal pattern with bimaxillary dentoalveolar protrusion.

Conclusion: Orthodontic Retractor (innovative appliance) effectively helped in completing the orthodontic treatment in a non-complaint patient without delay as was seen during the retraction phase of the treatment.

Clinical significance: "Orthodontic Retractor" can be used and advised for patients who are either less motivated or non-complaint. This appliance is simple and does not require any use of mini-implants, which is an invasive surgical procedure, which many patients does not consent for.

Keywords: Bracket debonding, Noncompliant patient, Retraction.

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Introduction

An effective result of orthodontic treatment is dependent on various factors, such as the acquaintance and clinical skill of the concerned orthodontist, the patient's cooperation, treatment duration, and many more. To achieve these, various orthodontic advances have been undertaken in the last decade, which are focused not only on improving orthodontic treatment but also on achieving more efficiency toward finishing the treatment in less time with the best possible outcomes. From a patient's or their parent's perspective, treatment duration has always been a subject of apprehension. To overcome this factor, the responsibility lies both on the clinician as well as on the patient, as patient cooperation plays a significant role.

Patient compliance issues are complex, multifactorial, and diverse in nature. Adherence can be evidenced by factors, such as both patient and parent's awareness of the need for orthodontic treatment, the timing of treatment, personality traits of both patient and parent, duration, and type of treatment.[1] According to several research studies reviewed, age is consistently and significantly associated with patient compliance.[2–4] Another study found that age was the best forecaster of patient cooperation toward orthodontic treatment.[5]

An important factor for patient compliance is motivation toward orthodontic treatment arises. Whenever there is a lack of motivation, there is always a deficiency in patients' adherence to the treatment; as a result, they worry less and do not follow the proper directives on taking care of the appliances in the form of brackets and wires present in the mouth, leading to increase in the potential for appliance breakage, thereby affecting the treatment outcomes.[2,6] Thus, patients that are less committed to treatment always present with higher bracket failure rates, longer treatment duration, decreased quality of life, increased financial expenses, and decreased well-being.[2,4] Such patients pose a challenge for an orthodontist to finish their cases.

Therefore, a case report is hereby presented where similar scenario was encountered with one of the patient who reported to the department of orthodontics for fixed mechanotherapy. Routine orthodontic treatment was planned and started after detailed case history and complete diagnosis. Once the treatment was initiated, the patient started coming with frequent bracket breakages. All the measures were undertaken to prevent this but all of them failed. Then, an innovative appliance was designed and fabricated with the purpose of diminishing treatment duration and enhancing patient compliance.

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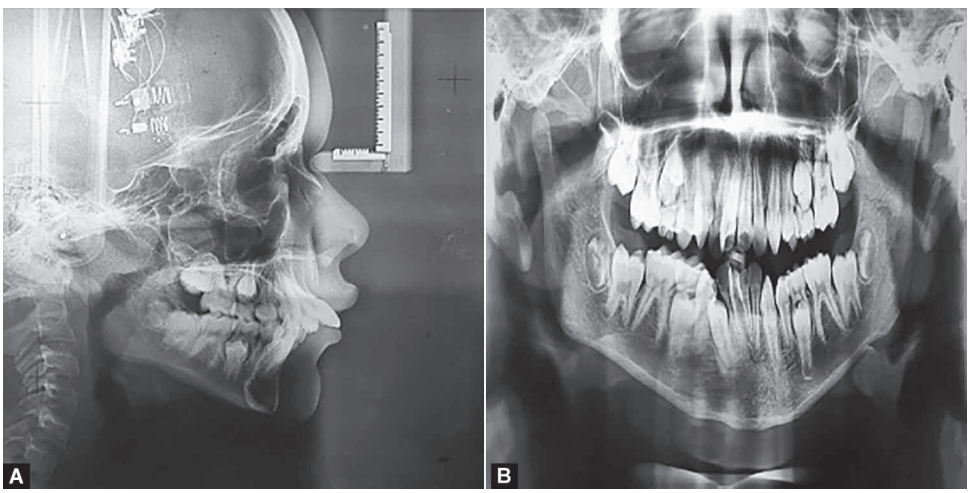
Diagnosis

A 14-year-old boy reported with the main complaint of proclined and irregularly placed upper and lower front teeth. A thorough case history was taken. Extraorally, the patient had a convex profile with lips incompetency. Intraorally, he presented with class I molar and end-on canine relationship with retained deciduous second molar in upper and lower arches with grade III mobility. The lower arch showed severe crowding in the anterior region with 2 mm of the curve of Spee. Overjet was 12 mm and the overbite was 2 mm (Fig. 1).

On radiographic diagnosis, the lateral cephalogram and its recordings showed a class I skeletal pattern with bimaxillary alveolar processes. The inclination of the upper incisors was 45° and 11 mm anterior to the nasion A (NA) line, as evidenced by the angle and distance of the upper incisors to the NA. As for the lower incisors,

Fig. 1: Pretreatment extraoral and intraoral photographs



Figs 2A and B: (A and B) Pretreatment lateral cephalogram and orthopantomogram (OPG)

the axial inclination was 20° and was 2 mm anterior to the nasion B (NB) line. Also, the incisor mandibular plane angle (IMPA) was 82°. Compared to the E line, the upper lip protruded 4 mm and the lower lip protruded 2 mm. The plane angle of the mandible was hyperdivergent [Nasion Sella—Gonion-Gnathion (NS-Go-Gn = 40°]. The nasolabial angle was acute (83°) with no signs or symptoms of temporomandibular disorder (Fig. 2).

Treatment Objectives

Treatment goals include the following:

- Orthodontic treatment for both arches and tooth extractions.
- Achieve a class I canine-molar relationship, ideal overjet, and overbite.
- Maintain a balanced facial contour.
- Improve the esthetics of your smile.

Treatment Plan

To achieve these objectives, the treatment plan included all first bicuspids extraction, extraction of all deciduous second molars for the eruption of second premolars, followed by decrowding of upper and lower front teeth, retracting the upper front teeth, decreasing the overjet, and lastly, final finishing and detailing.

Treatment Progress

A fixed, preadjusted bidimensional edgewise appliance (i.e., 0.018 slot) was used after extraction of all first premolars and second deciduous teeth. First, molars were banded and molar tubes were welded. Anchorage preparation was done using transpalatal. The leveling and alignment phase was initiated by ligating 0.014 inch NiTi wire in both arches, which was followed by 0.14 inch stainless steel (SS), 0.016 inch NiTi, 0.016 inch SS, and 0.016 × 0.022 inch NiTi for 1 month each. Along with this, passive lacebacks were also given for the passive retraction of the canine. Leveling and alignment were completed in a 3-month time period, and 0.016 × 0.022 inch SS wire was ligated in both the arches for 1 month. At this stage, the patient showed significantly less compliance toward the treatment. At each appointment, he reported frequent breakages of molar tubes and brackets, more in the upper arch. Due to this situation, an innovative appliance was fabricated so that the anterior teeth could be retracted and the case gets finished with good esthetic results.

Appliance Construction

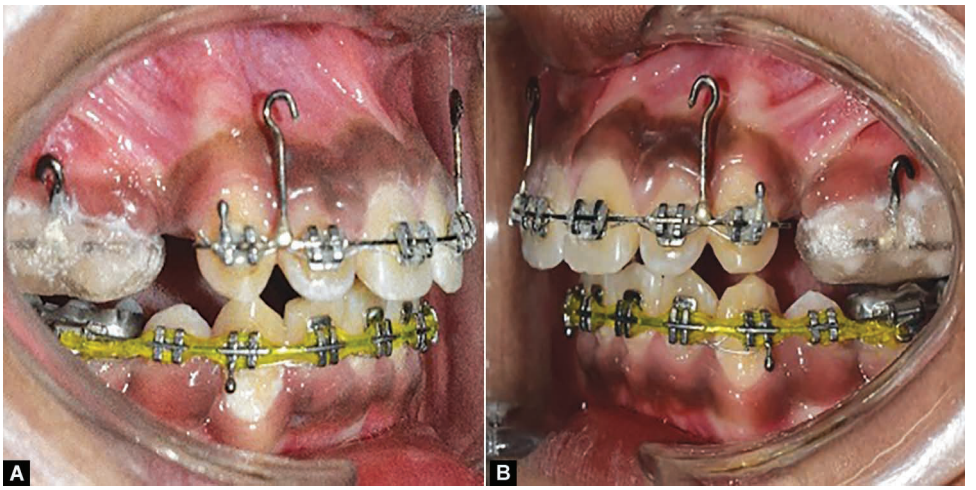
The first step in the construction of the appliance was to wrap and adapt a 21 gauge (0.032 inch) SS wire around the second premolar and first molar on both sides, that is, both the right and left sides

Figs 3A to D: (A) A 21 gauge SS wire wrapped and adapted around the second premolar and first molar bilaterally and both are connected to a 19 gauge SS wire TPA; (B and C) The 5 mm hooks were soldered bilaterally on wire framework; (D) Acrylic block made to aid in stabilizing the appliance

of the maxillary working model. The end of the wire was kept in the middle of the second premolar and first molar palatally. These were then soldered with a transpalatal arch (TPA) made of 19 gauge wire which was kept 2 mm away from the palate; the purpose was to enhance anchorage that transverses from the right and left side. Followed by this, a 5 mm length hook was fabricated using a 21 gauge wire which was soldered on the buccal surface on the wraparound on wire framework bilaterally between the second premolar and first molar. The purpose served by the hooks was to facilitate the retraction of anterior teeth. Lastly, the edge of the hook and the soldered joints were sandpapered so as to remove any irregular or sharp points that might hurt the mucosa of the oral cavity.

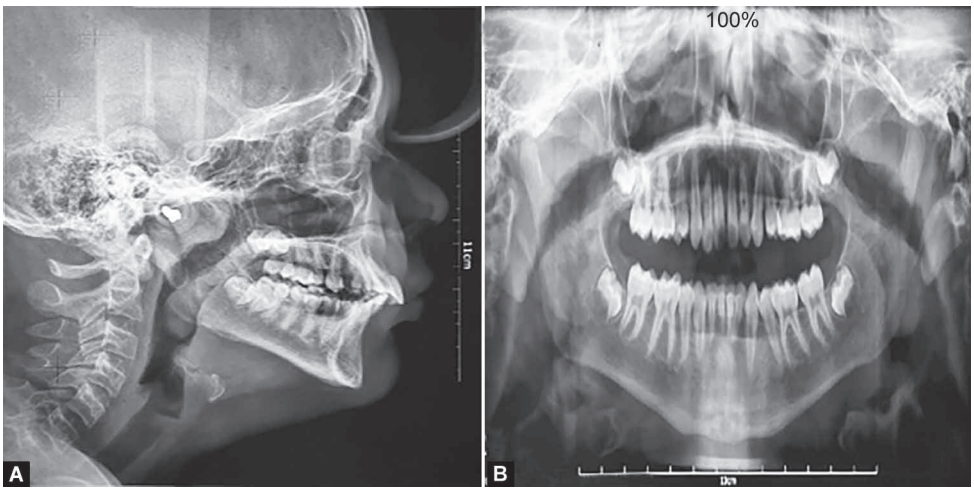
Once the wireframe was ready, separating media was applied to the working model, and cold cure acrylic was added on the wraparound wire using a sprinkle-on method covering the buccal, occlusal, and palatal aspect of the second premolar and first molar bilaterally. Occclusally, the thickness of the block was kept around 1 mm which assisted in the slight opening of the bite required at the stage of anterior retraction and also aided in stabilizing the appliance in position in the oral cavity. They were finished, polished, and cemented using type 2 luting glass ionomer cement on the second premolar and first molar bilaterally (Fig. 3).

Once the retraction appliance was in position, a retraction force of 200 gm was applied using an E-chain on both sides from a 7 mm hook soldered between the lateral incisor and canine to the 5 mm



Figs 4A and B: (A and B) A 7 mm hook soldered between lateral incisor and canine to the 5 mm hook on the appliance on both sides

Fig. 5: Posttreatment extraoral and intraoral photographs



Figs 6A and B: (A and B) Posttreatment lateral cephalogram and OPG

Table 1: Comparison of cephalometric parameters

Parameters	*Pretreatment*	*Posttreatment*
SNA	79°	82°
SNB	72°	76°
ANB	7°	4°
SN-GoGn	40°	35°
NPog-FH	87°	88°
U1-NA (°)	45°	30°
U1-NA (mm)	11 mm	5 mm
L1-NB (°)	14°	42°
L1-NB (mm)	2 mm	7 mm
Frankfort mandibular incisor angle	72°	45°
Frankfort mandibular plane angle	26°	26°
IMPA	82°	100°
E-line upper lip (mm)	2 mm	2 mm
E-line lower lip (mm)	1 mm	2 mm
Nasolabial angle	94°	108°
Overjet	18 mm	7 mm
Overbite	7 mm	4 mm

SNA, Angle between Sella-Nasion and Nasion to Point A; SNB, Angle between Sella-Nasion and Nasion to Point B; ANB, Angle between Point A, Nasion and Point B; NPog-FH, Nasion-Pogonion - Frankfurt horizontal plane; U1-NA, Upper Incisor - Nasion-Point A; L1-NB, Lower Incisor - Nasion-Point B

hook on the appliance (to prevent tipping while retraction) for en masse retraction of the anterior segment (Fig. 4).

Results

Within 4 months of force activation, the complete retraction of the maxillary anterior was seen without any anchorage loss with harmonious facial esthetics (Figs 5 and 6) (Table 1).

Discussion

Common orthodontic problems associated with its practice are patient cooperation and patient motivation. Both are directly related to following orthodontist care and hygiene instructions. So, whenever there is an amplified level of motivation, it might definitely decrease the brackets failure rate along with a reduction in treatment delays.

Changes in treatment duration have been reported to be associated with up to 46% of bracket failures.[6] The literature indicated that each bracket failure could be attributed to a 0.3–0.6-fold increase in treatment time.

Patient compliance is also associated with the age of the patient. Several studies have reported that patients under the age of 12 are more cooperative with orthodontic treatment than adolescents.[6] Another study by Sukhia et al.[5] reported that younger age-groups showed a greater prevalence of bracket debonding in both sexes compared with older age-groups ($p < 0.01$). The 14–16-year-old age-group had the highest debonding prevalence values of 40.4 in men and 36.7 in women. Also, a study by Allan and Hodgson[2] reported that age proved to be the best predictor of compliance with orthodontic treatment. Consistent with the studies above, the present study also showed that the patient who was in the adolescent stage was not compliant with the orthodontic fixed treatment as he reported frequent multiple bracket breakages at every appointment.

To overcome this issue, the "orthodontic retractor" was fabricated and used for the patient. Once the retractor was cemented onto the upper posterior teeth, it not only helped in the smooth initiation of retraction of anteriors but also reduced our dependency on the patient for his compliance. The appliance was kept in place till the whole retraction of anteriors was completed with the achievement of normal overjet and overbite. The case was finished with achievable esthetic results.

Conclusion

"Orthodontic retractor" proved to be an efficient appliance for the retraction of anteriors and finishing the case without any treatment delay. This appliance can be used and advised for patients who are either less motivated or noncompliant.

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